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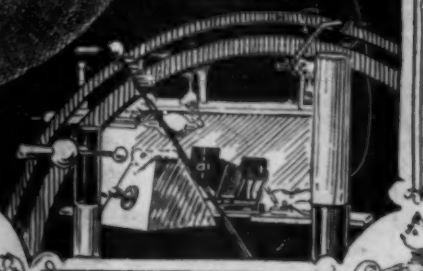
THE AMERICAN X-RAY JOURNAL

A MONTHLY DEVOTED TO THE PRACTICAL APPLICATION OF THE NEW SCIENCE AND TO THE PHYSICAL IMPROVEMENT OF MAN.



CHICAGO, ILL.

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Devoted to Practical X-Ray Work and Allied Arts and Sciences.
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A New Electro-Medicamental Treatment for Uterine Fibroids.

BY SAMUEL H. LINN, M. D.,
University of Pennsylvania, Class of 1877; Academy of Natural Sciences, Philadelphia, Pa; Monroe County Medical Society; Medical and Surgical College, St Petersburg, Russia, Etc.

In presenting this article I may, perhaps, be pardoned a digression in stating that for thirty-five years I have practiced surgery and must still firmly believe that the skillful surgeon can never be supplanted, as there are diseased conditions so hopeless and deplorable that any surgical interference is justifiable which offers even the hope of amelioration. On the other hand, what course should be pursued by a physician or surgeon who is in the vanguard of progress, after diagnosing a uterine fibroid, for instance, when the patient positively declares that she will not submit to a surgical operation? Would it be right to assert that surgery offers the only relief and to ignore a harmless and now well known treatment by which many serious diseases are averted, cured, or at least materially benefited? I do not recommend the routine use of any one agent or procedure to the exclusion of other rational remedies. I am fully aware that the remarkable advance made in medicine during the last decade is in a measure due to physical agencies, and I have now made the treatment of disease by electricity an essential and most important part of my practice, and desire to do justice to that science which, united with tenderness and sincerity, is truly achieving a mastery over the blind forces of nature.

Notwithstanding inflammations, indurations and abnormal growths in any part of the body may be treated by my method, I shall confine this paper to uterine fibroids, for which this new treatment is especially adapted. Indeed, I believe that it is the most reliable non-surgical treatment, as there is absolutely no danger of systemic infection which sometimes occurs from the use of electro-chemical cauterization.

Far be it from me to undervalue the merit of such a man as my esteemed friend, the late Dr. Apostoli, whose name is indissolubly linked with gynecology and electro-therapeutics. I would not unjustly criticise the apostolic method of treating fibroids, but—*sans peur et sans reproche*—I wish to cite two cases, simply to show that the first duty of the electro-therapeutist, as well as the surgeon, is *"ne pas nuire,"* do no harm. Electro-therapeutics is an art, altho some have made it a trade, and requires skill and manipulative ability, as well as a thoro anatomical, electrical and clinical knowledge.

CASE No. 1.—In June, 1897, Dr. W. called me in consultation regarding Mrs. A., about fifty years of age, who was suffering from general impairment of health, due principally to a uterine affection. She had an offensive leucorrhea, and the

pelvis and lower third of the abdominal cavity was partly filled with an irregular mass, which was diagnosed as a multiple fibro-myoma. The patient refused surgical interference, but consented to internal and intra-uterine medication and packing, from which treatment she improved somewhat, but the mass remained the same. I recommended a change of climate and advised Europe—Paris—also that she place herself under the care of Dr. Apostoli. I was asked to accompany her, and, having other business abroad, I consented.

As soon as we arrived in Paris, she commenced treatment with Dr. A. and his assistant, Dr. Planet; after the second treatment she was unable to go to Dr. Apostoli's office, and the treatments were continued at her hotel. They consisted of the regular Apostolic treatment, application of a clay electrode to the abdomen and a blunt carbon point to the cervix (intra-cervical, not intra-uterine). After three seances she was unable to sit up or continue the treatments; a phlebitis developed, and I called in consultation my brother, Dr. Thomas Linn, of Nice, formerly of Paris, France. He immediately remarked that the phlebitis was caused by the treatment, thereby confirming my opinion.

Case No. 2.—Mrs. H., nullipara, aged forty-eight, past the menopause, consulted me three years ago regarding a purulent, sanguinous discharge, backache and a sense of weight in pelvis. There was absolutely no sign of a tumor. Blunt curettage, packing and intra-cervical treatment gave comparative relief until about a year ago, when she again came under observation. I found cervical endometritis, catarrh, granular erosion and subinvolution. She was put upon a course of internal and local medication, without much improvement, when a consultation was held, resulting in the diagnosis of a fibroid tumor. On account of the low vitality of the patient and the fear of extensive adhesions, etc., surgical interference was proscribed, the patient also absolutely refusing to submit to an operation. Owing to the urgency of the case, the apostolic method was recommended. After two seances, using a current of not more than forty milliamperes, this patient was unable to continue treatment. Ascites immediately developed, filling the entire abdominal cavity, undoubtedly the result of the galvano-chemical cauterization. In my experience, these complications are not amenable to electricity alone, but require hydragogues, diuretics, etc., exhibited internally and by electrical diffusion to assist the emunctories in absorbing and eliminating the abnormal secretions; therefore, in resuming treatment, I employed, together with internal medication, electro-medicamental diffusion, which perhaps had a double effect, as it reduced the fibroid and at the same time favored the elimination of the peritoneal effusion. This case shows marked improvement with every indication of a cure. As an additional adjuvant, high tension faradism is being employed.

The unfortunate complications arising from the treatment of these cases led to careful investigation and to the conclusion that the apostolic method is not always harmless and antiseptic. As it is essentially a galvano-chemical cauterization, which tends to irritate and necrose, it also produces a sero-purulent discharge and inflammation often extending to the peri-uterine tissues, the vitality of which, having been previously reduced by pathological changes, constitute a "locus minoris resistentiæ" for the growth and multiplication of pus microbes, producing phlebitis and other inflammatory complications.

But is there not good in everything? Our failures often lead to successes along similar lines, so all honor to Dr. George Apostoli, to whose valuable contributions I am perhaps indebted for the inspiration which led to perfecting a method of treatment which is not the hasty product of a day, but the well ripened fruit of sage delay. I have no wish to claim more than rightly belongs to this method of cure, but I am fully convinced that in electro-medicamental diffusion we have a valuable addition to our armamentarium. It is a mild and effective treatment for all small growths, both benign and malignant, inflammations, etc., and should be used where time will admit and the tumor is not too large, when, of course, more strenuous measures are indicated.

The disagreement of eminent electrotherapeutists as to whether the positive or negative pole should be used for the diffusion of certain solutions has proved a great detriment to this method of medication. After numerous experiments, I became convinced that the surest way to obtain effective results in electro-medicamental diffusion was to rapidly alternate the galvanic current by means of an automatic pole changer, *which has a double advantage; first, it produces protoplasmic massage and stimulation, thereby overcoming the vis inertia of the tissues and preparing them to absorb the medicament while in an active condition, also equalizing the distribution of acids and salts; second, we obtain the effect of an entire compound instead of one element of a solution, to say nothing of "the surprising chemical affinity of alternating currents."*

As an adjuvant I employ true high tension faradism, which goes beyond the range of muscular contractility and is much more penetrating than ordinary

Fig. 1.

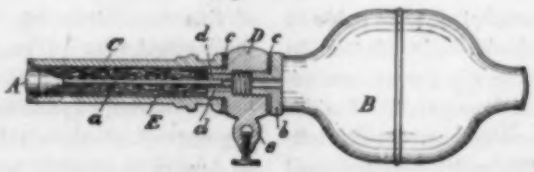

FIG. 1. LONGITUDINAL SECTION, SHOWING AIR BULB ATTACHED AND IN FULL SIDE VIEW.
A, aluminum contact surface.
a, aluminum stem rigidly secured to coupling D.
B, air bulb.
b, hard rubber coupling.
C, hard rubber sheath.
c, c, washers.
D, metallic coupling
d, threaded end of coupling
E, asbestos cord.
e, binding post.

Fig. 2.

FIG. 2. LONGITUDINAL SECTION, SHOWING CLOSED SHEATH WITH OPENING AT SIDE.
A^1, aluminum contact surface.
A^2, aluminum block.
a, aluminum stem rigidly secured to coupling D.
C, hard rubber sheath.
c, c, washers.
D, metallic coupling
d, threaded end of coupling
E, asbestos cord.

DR. LINN'S ELECTRODE.

faradism, therefore positively reinforces functional activity; altho it does not seem as strong, yet the power of the current is increased in proportion to the added number of lines of force.

Before giving my modus operandi, I wish to state that while I am not the manufacturer of the electrical apparatus and special electrode which bear my name, they owe their existence to the fact that notwithstanding the numerous electrical appliances on the market, I was unable to find a battery and electrode adapted to my method of employing electro-medicamental diffusion so suggested. Besides the electrode, a portable combination battery, embodying the novel features used in my work, such as the automatic pole changer and high tension faradic coil, the straight galvanic and a novel sinusoidal current.

In order to obtain effective results in electro-medicamental diffusion, I was convinced that we must maintain a constant regulable supply of the electrolyte to the tissues, preferably forced en nappe over the contact surface of the electrode, which should be of small diameter in order to concentrate the current. The rapidity of its action doubtless is due to the thin film of electrolyte supplied and to the metallic surface of the electrode being as near the tissues as possible, thereby lessening the resistance and permitting the use of a current of low potential. There is no possible clogging of this electrode, as it can be easily cleansed and sterilized.

MODUS OPERANDI.

The first step is to wind the metallic stem of the electrode with specially prepared asbestos cord, as, owing to its pure incombustible nature, there is no danger of the medicament becoming contaminated. The parts of the electrode are then put together and the asbestos saturated with the medicament through the small holes in the coupling. The supply of electrolyte is regulated by means of the air bulb, and, when constantly maintained, there is no danger of burning the tissues.

The abdominal electrode may be of almost any variety of the flat electrodes. The usual antiseptic rules are strictly followed in this work.

Perhaps some of the younger members of this Association may be interested in the method which I employ for lowering the uterus without volsella or tenaculum, or more strictly speaking, of bringing the vaginal cul-de-sacs within easy reach. It is done by inserting a double Ferguson speculum, so to speak, which consists of two hard rubber cylinders, the inner one being metal lined and twice the length of the outer one (see cut). They are inserted as a single instrument and when the desired point is exposed to view pressure is made upon the rim of the shorter one and the other allowed to slip from the vagina. By this means the anterior, posterior or lateral cul-de-sacs are readily brought within touch of the index finger. I have never seen a description of this painless and antiseptic method for gaining easy access to these parts, although it was taught me in Vienna some twenty-five years ago. As the majority of our fibroid cases are subserous I am sure this simple method of reaching the desired points for treatment will be appreciated.

With regard to current I usually begin with two or three milliamperes, regulating the increase during the first seance according to the sensitiveness of the patient, whom I ask for continual information regarding the possibility of pain. Very effective electro-medicamental diffusion can be produced by the use of five to seven milliamperes and is usually well borne, altho in some cases I use nine mil-

liamperes. I am in the habit of treating my patients twice a week, each seance lasting from ten to fifteen minutes.

In conclusion I shall cite two of the many satisfactory cures made by my method of using medicamental diffusion.

Case 3.—Mrs. —, multipara, age thirty-eight, enlarged uterus, colitis and excessive nervousness. Consultation confirmed diagnosis of a multiple, nodular fibromyoma; immediate operation was advised; the patient positively refused surgical interference. The uterus was more than four times its normal size. After three months' treatment as described, two seances a week, the nodules disappeared and the uterus was restored to almost its normal condition.

In treating this case I applied the contact surface of my special electrode at two or three different points high up in the anterior vaginal cul-de-sac, and an ordinary flat electrode on the abdomen. As already mentioned the majority of uterine fibroids being of a subserous origin are easily reached through the mucous membrane of the anterior cul-de-sac, the absorbent power of which is well known. In this case I use three to five milliamperes the first month, five to seven the second month and seven to nine the third month, regulating the increase according to the sensitiveness of the patient.

With this patient I also used high tension faradism over the uterus for half an hour daily, and general static electrization.

Case 4.—Mrs. M., age thirty-six, consulted me regarding urinary incontinence following occasional attacks of retention occurring about her menstrual periods, which were regular and normal. She is stout and plethoric in appearance and did not complain of any other well marked pressure symptoms except pain and weight in the pelvis. I found a congested cervix and surrounding tissues of the ecchymotic hue characteristic of fibroids, a profuse, tenacious mucous discharge from the cervical canal; a rather large subserous fibroid was readily diagnosed by ballottement.

The treatment was identical with that followed in Case 3, with the exception that static electricity was not employed. She was treated for three months, two seances a week; her condition is now almost normal.

As my experience with this method of treating fibroids has been confined to small tumors of the subserous variety, I am unable to say anything regarding its efficacy in very large tumors and cases accompanied by severe hemorrhage.

243 Alexander St., Rochester, N. Y.

Electro Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro Therapeutics.

LESSON 7—INDUCTION.

When there is a steady electric current in a wire the rotation of the innumerable chains of atoms, all in the same direction, carries with it to some extent the elastic ether about the wire. That portion of ether lying close to the wire is strained to some little distance in the direction of the rotation; just as the portions of jelly near a stick that is rotated in it are carried a little way in the direction of its rotation. The parts of ether lying further from the wire are displaced to a smaller degree, and this displacement becomes less and less as we go further from the wire. When the current stops, the ether is relieved of its stress and returns to its normal position. An atom lying in the ether adjacent to the wire before the current begins is, when the current starts, moved bodily to a slight extent in the direction of the rotation; but the side of the atom nearest the wire is moved further than the other side; consequently the atom is rotated thru a small angle in a direction opposite to the rotation in the wire. Thus when a positive current, whose rotation we assume is right handed, is started in the wire it causes, in all the atoms lying near, a slight left handed rotation, which is, according to the Vortex theory, a slight negative current. The intensity of this induced current at any moment depends upon the force which is conveyed to the atoms at that moment by the moving ether and upon the resistance (according to Ohm's law) of the conducting circuit in which these atoms happen to lie; but the total quantity of current (the time integral of the current) generated in a secondary circuit by starting a current in the primary wire, depends only upon the intensity of the primary current and its position in reference to the secondary, in the absence of any other electromotive force; because this is represented by the angular rotation given to the atoms in the secondary circuit. When the positive current in the primary stops, the atoms return to their original condition and in so doing make a slight right handed rotation which is a slight positive current. The total quantity of the induced current of starting (the "make" current), is necessarily the same as that of the induced current of stopping (the "break" current). If the resistance in a secondary circuit is exceedingly small and if the conditions are such that the extent of displacement of ether is great, then the velocity of the ether in returning to its normal position on the sudden stopping of the primary current may be so great as to carry it past the point of equilibrium and produce a strain in the opposite direction, and it may oscillate across the neutral line a number of times before finally coming to rest. This will cause a similar oscillation in the atoms of the secondary circuit, giving rise to an induced oscillatory current.

The electro motive force of the secondary is increased by every condition which increases, from a mechanical standpoint, the effect of the primary current upon the atoms of the secondary. These conditions are (1) nearness to the primary, (2) length of the secondary exposed to the influence of the primary, (3) velocity of change in the primary current, (4) magnetic conditions which affect the amount of rotation of the surrounding ether as distinguished from its linear displacement. The amount of current in

the secondary depends upon (1) the magnitude of its electro motive force, (2) the length of time during which its electro motor force is maintained, which depends upon the total amount of rotation induced in the atoms of the secondary, (3) the resistance of the secondary circuit.

It is evident that all the induced currents produced by any stationary apparatus are alternating, and it is to currents of this class that we shall confine our attention during this lesson. The action of a dynamo in producing induced currents is upon this same principle. If instead of starting and stopping the primary current, we should maintain it steadily, so as to keep a field of ether strain about the wire, and the secondary wire be then suddenly brot near the primary, the same effect is produced upon the secondary wire as was produced upon it when the current was started. When the secondary wire is moved suddenly away from the primary the effect is the same as when the current in the primary was stopped. So that if a wire or a coil be made to rotate into and out of a field of ether strain such as surrounds electric currents and magnets, alternating currents are induced in the rotating coil. If a direct current is desired from such an apparatus a mechanical contrivance called a commutator is used to change the connection of the coil with the rest of the circuit at each half revolution. The outer part of the circuit then receives pulsating currents which are always in the same direction.

Until recently almost the only apparatus which was used therapeutically for the production of alternating currents was a small inductorium, consisting of a wire helix connected with a galvanic battery and constituting the primary circuit, around which was a secondary coil consisting of a large number of turns of finer insulated wire, close to but insulated from the primary helix. A mechanical arrangement for automatically making and breaking the primary circuit is attached. Inside of the primary helix a soft iron core may be inserted. This insertion increases the inductive effect of the primary upon the secondary. Sometimes the coils are made movable with reference to each other, so as to increase or diminish the induced current. Sometimes a metal shell is inserted between the two coils so as to reduce the secondary current. Sometimes a rheostat having a high resistance is used in the secondary circuit for controlling the current.

In recent years various devices for producing alternate currents have been employed, some of which are much superior to the old "Faradic battery" which has just been described. Some of these will be considered later, but since the faradic coil is in the hands of a great many physicians, some of whom are more or less completely ignorant of its value and use, and since it is so small as to be easily portable, something more may be said in reference to it. The current produced by the faradic coil is alternate but is exceedingly irregular in form. The irregular variations in the direction and intensity of the current causes a relatively large amount of muscular and sensory disturbance which limits the usefulness of the machine.

The physiological effects of the alternate currents are (1) motor (2) sensory, (3) chemical. The motor and sensory effects depend mainly upon the velocity of increase or diminution of the current; the chemical to the total amount of current and to the number of changes per second. Of these the chemical effect is by far the most important therapeutically. It consists in a general shaking up of chemical constituents of the tissues and

a consequent acceleration of the normal tissue changes. Of the three principal organic processes by which life is carried on, namely, nutrition, metabolism and elimination, the alternating current affects the first and last scarcely at all and the second very strongly. In order to secure the best therapeutic results, therefore, the processes of nutrition and elimination must be looked after by the physician at the same time by other means while using these currents.

Alternating currents are applicable to such a large number of disease conditions that the enthusiast is in danger of forgetting they are not in any sense a cure-all, but have certain physiologic and therapeutic properties which are clearly defined. In view of this property of accelerating metabolism the faradic currents are applicable in nearly all cases of chronic diseases and in these cases should be used to the limit that can be readily borne by the patient. With other forms of apparatus giving a smoother current the amount of current must be limited by the judgment of the operating physician and not by the sensations of the patient. As examples of chronic conditions which may be benefited by this treatment we may mention non-malignant tumors of deeper parts of the body, ulcerations both external and internal, chronic neuritis of nearly every form, myalgia, neuralgia. In acute and subacute bronchitis and some other similar conditions of the chest the use of the faradic current on the muscles of the chest and shoulders is advantageous in clearing up the conditions of these tissues, increasing the depths of breathing and permitting a rapid reduction of the internal inflammation.

In treating deep seated conditions of this sort large flat electrodes should be applied externally, with one or more layers of damp blotting paper between the metal and the skin, in such a position with the greatest possible amount of current passes thru the part to be treated.

The motor effects of the faradic current are valuable in cases of paralysis in order to maintain the condition of the muscles during the time of nerve regeneration. They are of much greater general value, however, in atonic conditions of the involuntary muscular fibers in various parts of the body, particularly the skin, stomach, intestines, uterus and uterine ligaments.

The sensory effects of the faradic current have been little investigated. A stimulating effect upon the whole nervous system is produced by strong sensation, as in all other cases, and this combined with the motor and chemical effects renders the faradic current invaluable as a general tonic. In cases of acute inflammation the current may be applied in an exceedingly mild way to cause gradual constriction of the dilated blood vessels thru the sensory reflexes, but if not used with almost imperceptible mildness this result will not be obtained. And this method of reducing inflammation is inferior to several other kinds of treatment. Very rapid alternations in a faradic current are much less irritating to the nerves than slower alternations.

The static machine has the disadvantage of being too large to be conveniently portable, but for office use the alternate current which is obtained by placing the patient in the circuit connecting the outer coatings of two Leyden jars whose brass balls are in contact with the prime conductors of the machine, is much superior to any that can be obtained from a faradic coil. When the discharging rods of the machine are about half an inch apart, each spark is accompanied by an alternate discharge in the Leyden jar circuit, and

if the balls on the ends of the rods are small so that the succession of sparks is very rapid the alternate current in the Leyden jar circuit is very nearly sinusoidal, and has all of the chemical effects of the faradic current with a very small portion of its sensory and motor effects. The latter can be obtained in sufficient quantity even here by increasing the distance between the discharging rods. Almost all of the conditions in which the faradic current is useful can be treated more successfully with the sinusoidal current from the static machine. A small convenient portable apparatus of some sort giving sinusoidal currents similar to these would be a boon to the practician.

EDITORIAL

We are in receipt of the 1904 Antikamnia Calendar, an attractive souvenir, presented by the Antikamnia Company of St. Louis.

The Bario Vacuum Company, of New York, have introduced a new water-cooled tube which will stand a very heavy current and is easily repaired if punctured.

Dr. Heber Robarts, of St. Louis, has sufficiently recovered from his recent illness to be about to take a trip to Europe. While there he will visit a number of laboratories and other electrical and radio-therapeutic institutes. We wish for his early return with greatly improved health and strength.

Dr. Carrie O. Heald, of Oceola, Neb., who was an enthusiastic x-ray worker and highly esteemed by every one who knew her, died at her home November 18, 1903, of typhoid fever. She graduated from the North Western Medical College in 1897. Her bereaved family have our deepest sympathy.

Poughkeepsie, N. Y., Dec. 9, 1903.

Editor X-Ray Journal:

Dear Sir—In your November number, page 325, is an article on "Vibratory Therapeutics," written by H. Fuller, in which there is very evident plagiarism. Beginning with the words "For this purpose," page 326, first column, line seven from top, and ending with the word "limited," at the close of second paragraph of next column. This is taken almost word for word from an article by Albert C. Geyser, M. D., in the October number *Journal of Advanced Therapeutics*, pages 614-15.

We trust this matter will not be allowed to pass without public notice in your journal. Yours very truly, H. W. Barnum.

The title of this Journal expresses its principal feature, but as all of our readers are aware the columns of the Journal are not confined to discussions of the x-ray alone. The present editors have aimed to cover as completely as possible the field of x-ray and electro therapeutics, with such other items as are of especial interest in connection with these lines. With the next number of the Journal we propose to widen our range so as to include all progressive lines of therapeutics. The least attention will be given to drug ther-

apy, as this part of the ground is well covered by existing journals. We are led to take this step because experience has shown that when the physician's attention is confined closely to any single method in therapeutics he is unable to derive from the study the same advantage as when each method is shown in its proper relation to the rest. X-ray and electro therapeutists are often charged with therapeutical narrowness. This charge is sometimes true. This JOURNAL is devoted to therapeutic science and art, and not to any particular theories or methods. Its field is progressive therapeutics—the application of the forces of nature to the cure of disorders and the upbuilding of the race.

The American Electro Medical Society.

The first annual meeting of this Society was held December 1 and 2 in room 412 Masonic Temple, Chicago. The visiting members were welcomed by Dr. Elmore S. Pettyjohn, president of the Illinois State Society. He congratulated those present upon the scientific program that was before them. Organization is necessary for efficiency in any department of work. Physicians especially are in danger of becoming self centered and dictatorial. Both broadness and culture are secured by wider association, and by the same means medical science is advanced and knowledge disseminated. The advantages and the necessity of organization are shown by the recent advances in the line of electro therapeutics, and the epoch making discovery of the Roentgen ray, which has become invaluable to surgeons as a diagnostic agent, and which has excited such remarkable interest as a therapeutic agent in diseases of the skin, tuberculosis, and cancer. It is the single aim of this society to advance science and art in relation to therapeutics. There is a world before us of knowledge which is to be opened up in the application of various physical agents to medicine. This is our aim and in this we will unquestionably succeed.

Dr. H. Preston Pratt, president of the American Electro Medical Society, stated that altho the Society had been organized but a short time it is meeting with remarkable success, having already more than one hundred and fifty members enrolled. He requested Dr. Pettyjohn, as vice-president, to occupy the chair during this session.

1. The Roentgen Ray and Surgery.

Dr. O. Shepard Barnum, of Los Angeles, Cal., president of the Southern California Electro Medical Society, was unable to be present. His paper, which was read by the secretary, called attention to the very large per cent of recurrence in all kinds of cancers after removal by the knife, and justified the eagerness with which physicians had searched for some better treatment, particularly since cancer is increasing in all parts of the country. The x-ray is no longer an experiment. We know what it can do, its dangers and its virtues. It is (1) stimulating, (2) inhibitive, (3) destructive. The destructive action is chiefly to be considered in regard to the treatment of cancers. It is not a fair substitute for the knife in operable cases. In the majority of cases the surgeon's aid should be enlisted, (1) to expedite the work, (2) for the comfort

of the patient, (3) to prevent septic conditions, (4) to insure against too extensive necrosis. The combination of the x-ray and the knife is better than either alone. In cancer of the breast, for instance, the knife may entirely remove the ulcer and contiguous indurations, leaving the pectoral muscles, glands and tissues of the neck, and possibly of the axilla, for the action of the ray. The ray should be used conservatively before operation in malignant conditions, and should invariably follow the knife as a prophylactic.

Dr. S. D. Greenwood, of Neenah, Wis., inquired as to the extent of the raying to be used after an operation; to which the Secretary responded that no screen should be used at all except to protect the face and hair.

Dr. H. P Pratt approved of the paper, especially of the advice to use the ray both before and after an operation. The ray causes a rapid increase in connective tissues and so chokes up the channels of infection.

Dr. Pettyjohn inquired what effect the x-ray had upon the healing process.

Dr. Pratt replied that it was not so good as the positive static breeze. The x-ray is liable to dry the tissues too rapidly.

The Secretary called attention to the dangers of using the rays too strongly either immediately before or immediately after operation, as sloughing might occur.

2. X-Ray Burns.

Dr. R. S. Gregg, of Chicago, attributed x-ray dermatitis to the chemical properties of the x-ray, corresponding to a sun burn.

If x-ray treatment be excessive the anabolic process of the tissues is unable to meet the katabolic process which has been accelerated by the rays. In deciding upon the susceptibility of the patient, idiosyncracies are not to be considered. The condition of the tissues is the all important fact. It is thoroly practicable to expose healthy tissue along with diseased. By close watching the operator can stop short of the destruction of the healthy tissue, since the diseased tissue is destroyed first. The treatment for an x-ray burn is, omit intense raying, increase the visceral elimination and apply mild antiseptics, etc., locally. It is not advisable to produce an x-ray burn in order to bring about a cure, especially in an ulcerated area, because a very rapid metastasis invades the adjacent inflamed area, the disorder spreads and the patient may die of sepsis. Parts exposed should be protected against the particles of dust thrown off from the surface of the tube.

Dr. Hamilton Forline said that while he knew little of the x-ray practically the slowness of the healing of an x-ray burn emphasized the necessity for keeping the tone of the tissues as high as possible.

Dr. Pratt stated that Dr. Gregg had had an experience of several years in this work and his conclusions are especially valuable.

Dr. Pettyjohn approved heartily of the advice to drain the patient—not his pocketbook. Specialists are apt to forget the man behind the disease. Good rich blood is, after all, the best healer.

3. Cell Tonic Adjuvants in X-Ray Treatment of Malignant Neoplasms.

Dr. Hamilton Forline, of Chicago, gave a number of cases in which cell tonics had been used with remarkable success in chronic cases. He referred particularly to cases of tuberculosis, chronic arthritis and cancer. While the x-ray breaks down abnormal tissues the cell tonics are a great aid in rebuilding the normal tissues, both hypodermically and by mouth.

Dr. Pratt stated that Dr. Forline was using lymph injections in his laboratory

on some cancer cases. As a tissue builder it's just what we want.

Dr. Replogle inquired if this lymph was anything like the Roberts-Hawley compound, and whether anti-syphilitic treatment had been used in the tabetic cases.

Dr. Forline replied that he had used the Roberts-Hawley solution, whose formula he gave, and that it contained eliminants. He had found mercury and the iodids of very little use in tabetic cases of long standing, tho he had used them occasionally to reduce pain. Pain is stopped by lumbar puncture and withdrawal of cerebro-spinal fluid up to one ounce at a time. If lymph is injected without previous withdrawal, pain is temporarily increased. The lymph increases the elimination of urea, carbon dioxid, etc., in 95 per cent of the cases in which it is used.

4. The Medico Legal Value of Roentgen Rays.

On account of lack of time Dr. Mihran K. Kassabian's paper was read by title. It will appear in the JOURNAL.

5. Electrolysis in Relation to Public Health.

The Hon. Edward B. Ellicott, city electrician for Chicago, was suddenly called to St. Louis on business connected with the World's Fair and was consequently unable to be present. His paper was read by title and will be published.

6. Applications of the X-Ray.

Dr. Heber Robarts has been seriously ill and was unable to prepare his paper in time for the meeting.

7. Galvanic Electrolysis for Stricture of the Urethra.

This paper, by Dr. J. C. Luke, of Oscilla, Ga., was read by the secretary. His method is the same as was perfected by the late Dr. Newman, except that he gives treatments a little more frequently, taking care, however, to wait until the inflammation from the previous treatment has entirely subsided. Some cases were given in detail to illustrate his technic. The secretary called attention briefly to the history of this method of treatment and to its recognized value in cases of urethral stricture.

Dr. Pettyjohn related a case of stricture which he had treated by electrolysis before the present methods were perfected, and had succeeded in perforating the perineum. In spite of this accident the stricture was finally overcome and the patient made a good recovery.

8. X-Ray and Electro Therapeutical Practice.

The Hon. John E. Kehoe, former trial attorney for Chicago, read this paper. He related several cases in his experience in which electrical diagnosis had enabled him to detect fraud in defending the city against damage suits. In one case a boy was terrorized by threats, and his guardian pretended that he had been dumb since a fall occasioned by a defective sidewalk. When a faradic current was applied the boy screamed and begged for mercy. He is believed not to have spoken before for a full year. Mr. Kehoe expressed his gratification that the x-ray and electricity was now able to throw so much light upon cases of personal injury that the genuine can be distinguished from the fraudulent with a great degree of certainty.

Dr. Hall expressed the opinion that it would not be difficult for the x-ray expert to deceive a court and jury, if so inclined and if not watched by an expert on the other side. Such diagnosis must always rest ultimately upon the reliability of the expert as well as the accuracy of his methods.

Dr. Pratt remarked that the agents of certain corporations that are interested in pushing fraudulent claims for damages

were anxious to stop this kind of diagnosis on the part of the city. This paper is exceedingly good and deserves wide publication.

9. A Study of Light—Ultra Violet Rays.

A very extensive explanation of the properties of ultra violet light were given by Dr. J. Mount Bleyer, New York. His paper was partly read and partly summarized by the Secretary. Dr. Bleyer has made some new and powerful ultra violet tubes, which are simply ordinary vacuum tubes exhausted to a degree just below that required for x-rays. When the tube is electrically excited ultra violet rays of great intensity, which have the power of passing thru glass and many opaque substances, are given off. Dr. Bleyer contrasted the properties of these rays with the statements usually made by physicists regarding the penetrative power of ultra violet rays. The same rays had been observed by others coming from Geissler tube.

Dr. H. B. Forline inquired whether ultra violet rays were produced in any considerable quantity from an arc light in which the carbon contains some copper sulfate. He had seen good results obtained by the use of such a lamp in the treatment of lupus.

The Secretary replied that while he had not seen such a lamp tested it would not be surprising if ultra violet rays were given off in large quantities from it. He doubted whether, after all, the rays from Dr. Bleyer's tube were identical with the ultra violet rays. The differences in their power to pass thru glass were suggestive of a marked difference in their nature. Dr. Bleyer's investigations in this direction are of the greatest value.

10. X-Ray Diagnosis of Ureteral Calculi.

This paper, by Drs. Byron Robinson and R. S. Gregg, gave a full report of the methods by which ureteral calculi can be accurately diagnosed by the x-ray. In reading the paper Dr. Robinson stated that the x-ray is capable of detecting the calculi, because every ureteral calculus, whatever its nature, gives a distinct x-ray shadow; and failures to detect a calculus when present are due to faulty technic or an inability of the operator to interpret the shadow. The essential things in taking a photograph are to empty the alimentary canal and to get a good photographic plate close to the patient.

The paper dealt with these matters very fully and gave details of work done in Dr. Pratt's laboratory.

11. Electrical Diagnosis.

Dr. S. V. Clevenger, the reader of this paper, said that the old writers on electro therapeutics were so obscure as to be in many cases unintelligible. They made everything as complex as possible. Their formulas for electro diagnosis shared this general muddiness. Many years ago he had suggested a simplification of this nomenclature by leaving out the last letter of the formulas C C C (Kathodal Closing Contraction), etc., and replacing it with a number giving the milliamperes necessary for contraction. The formulas C O C and A O C are practicably useless. We have then the following simplification; for the arm C C 3, A C 5, normally, which in degenerative conditions becomes C C 5, A C 3. For the leg we have normally C C 7 and A C 10, which in degenerative conditions becomes C C 10, A C 7. This nomenclature has been adopted by many electro therapeutists and often without acknoledgment.

12. Cutaneous Hypertrophies; Their Treatment by Electrolysis.

Dr. H. Perkins Fitzpatrick, Chicago, apologized for turning the attention of the Society away from the more serious subjects to the consideration of minor diffi-

culties involving the cosmetic rather than the physical condition of the patient. He then gave a brief synopsis of the relation found practically between facial blemishes and various nervous disorders, to emphasize the value of facial treatment as a means of relief for even these more serious conditions. He then described in detail the electrical processes which he was in the habit of using for the removal of facial blemishes. This kind of work must always remain to a considerable extent in the hands of the specialist, since success depends not only upon knowing what to do and how to do it but also upon a steady hand, a clear eye and an experienced judgment.

Dr. Clevenger inquired whether the negative electrode was used in all cases.

Dr. Fitzpatrick said yes, except in angioma. The negative electrode is used for everything but plexuses. A steel needle may be used as a negative electrode but a platinum needle is more satisfactory in all cases. If the needle is not fine enough, grind it finer. Reduce inflammation when necessary by the use of hot water and the application of zinc ointment.

Dr. Pettyjohn expressed his satisfaction that we have among us a medical man who is a specialist in this department of work. He heartily approved of the paper.

13. Suggestion in its Relation to Electrical Applications.

Dr. Charles Gilbert Davis began by stating that force and consciousness are the only essential existences. Thru the senses, which are the windows of consciousness, man gets impressions, and these are suggestions. Faith, hope, expectancy and belief are agents producing physical effects. He gave a report of a case in which one grain of calomel acted as an excellent hypnotic when coupled with suggestion; but suggestion must always be made along the lines of scientific truth. This is important. Introspection is liable to create disease. Faith, like electricity, must have a conductor by which it can be conveyed thru the senses.

Dr. Lewis said there are two distinct kinds of mind, the conscious and the subconscious. These two phases of consciousness belong separately to the two nervous systems. The subconscious kind receives its stimulus only from the cells of the body, including the brain. The cerebro spinal system, the organ of conscious mind, relates mainly to outside affairs; and excessive stimulus from without acting upon the brain disturbs the subconscious system and produces in consequence all kinds of physical disorders. Therapeutic effects are produced in a similar way.

Dr. Pettyjohn related a case in which a small dose of calomel had enabled a patient troubled with insomnia to obtain sleep for three nights. Every physician must be a psychologist. Every cure is a faith cure, and every remedy is a faith remedy acting along physiological lines. Physicians should know this and not leave suggestive therapeutics to quacks.

Dr. Forline thot that if it was possible to demonstrate fully the power there is in suggestive methods our power would be almost unlimited. Suggestive minds control almost all the organs of the body. We all use suggestion. Personality, the ability to inspire confidence, is most important.

Dr. Greenwood said the use of suggestive therapeutics is not elective with the physician. Suggestive effects are produced whether the doctor wishes it or not, and the only sensible thing for him to do is to make himself familiar with the laws of suggestion and apply them scientifically.

Dr. Sayer said he had watched Dr. Pilgrim's clinics until convinced there was no fake about them. Nervous troubles are most readily overcome by this means. He had seen a woman, crazed by the loss of her children, cured by this means in a week or ten days. He was in the habit of referring obstinate cases of constipation to Dr. Pilgrim for cure.

Dr. Pratt said the human body resembles a magnet in that the forces in it affect another body. Telepathic impulses reach even to the other side of the world. The impulse, thru the senses, whether conscious or unconscious, produces a current to the brain and makes an explosive disturbance among the molecules there.

Dr. Davis in closing said the subject was too broad to explore fully at present. His paper was merely suggestive. Back of all untruths in popular superstitions lies the truth in suggestion. A few years ago he had read a paper before Chicago Medical Society upon this subject which had acted like a red flag before a herd of bulls. He was glad to know that many of those same physicians had since then expressed a change of view regarding suggestion. He emphasized again his statement that suggestion must follow lines of truth. Mere placebos are not good. Give medicines as needed and make them a conduit for true suggestion.

14. The Distribution of X-Rays from a Crookes Tube.

Dr. T. Proctor Hall described some experiments made to obtain the relative intensity of the x-ray from the various parts of the illuminated hemisphere of the Crookes tube. Curved strips of sensitized film were exposed to tubes of various degrees of vacuum. The results were illustrated by diagrams and showed that the zone of greatest intensity varied in position according to the vacuum of the tube.

15. First Principles in Electro Therapeutics.

This paper, by Dr. H. Preston Pratt, discussed the facts of electricity and x-rays in the light of the electron theory, and attempted an explanation of the changes produced in the tissue by means of movements of electrons which result in dissociation of the ions. He enlarged also upon the concept of each atom being composed of a large number of electrons whose motions are in harmonic ratio to each other. As soon as this rate of oscillation is disturbed some of the electrons break away from the atomic system. Electricity he considers to be the same as the force between atoms. Lodge says that the electrons are units of electricity. Gravity also, in Dr. Pratt's view, is an electrical phenomenon.

Dr. Hall stated that the concept that each atomic group consists of a moving system whose parts have harmonic relation to each other was announced by the chemist Mendeleef many years ago, who at the same time pointed out that a stable molecule must consist of atoms whose oscillations are harmonious, and that a discordant rate of vibration meant molecular decomposition. There is no doubt that this view will be much more fully developed in time. Dr. Lodge tries very earnestly to explain matter in terms of electricity, or electricity in terms of matter, but all such attempts are absolutely worthless, for to anyone except an idealist matter and energy are entirely distinct concepts. There is no probability at present that electricity and gravitation will be more closely identified than is expressed in the statement that they are both forms of ether strain.

Dr. Rufus H. Bartlett congratulated the Society upon the new facts and theories which were being brot to their attention thru this meeting. In a few

years' time there will no doubt be a multitude of discoveries in the realm of molecular physics and in the applications of electrical science to medicine and the arts.

For want of time the following papers were read by title:

16. Clinical Observations of the X-Rays, by John E. Gilman, M. D., Chicago.

17. Causes and Forms of Treatment in Chronic Prostatitis, by F. A. Leusman, M. D., Chicago.

18. Recent Advances in X-Ray and Electro Therapeutics, by Elmore S. Pettyjohn, M. D., Chicago.

19. Combined X-Ray and Chemical Treatment of Cancer, by O. W. McMichael, M. D., Chicago.

20. X-Rays in Malignant Tumors of the Eye, by John E. Harper, M. D., Chicago.

21. Electricity in Cataracts, by J. Lloyd Hammond, B. S., M. D., Chicago.

22. Electricity in Drug Habits, by R. H. Bartlett, M. D., Chicago.

23. Electricity in Gynecology, by Gustavus M. Blech, M. D., Chicago.

24. Clinical Notes on the X-Ray in Diseases of the Skin, by C. D. Collins, M. D., Chicago.

25. The Vortex Theory of Electricity and Magnetism, by T. Proctor Hall, A. M., Ph. D., M. D., Chicago.

The attendance at the meeting was small, owing partly to insufficient advertisement and partly to the fact that it was an especially busy season for those locally interested. The sessions planned for December 2 and 3 were both held on December 2, to accommodate a number of members who were unable to remain longer. It turned out, however, that a considerably larger number, who were unable to be present until the last day, were disappointed by this change.

At the meeting of the National Executive Council the following officers were elected for the ensuing year:

President—O. Shepard Barnum, M. D., Los Angeles, Cal.

Vice-Presidents—T. Proctor Hall, Ph. D., M. D., Chicago, Ill.; Heber Robarts, M. D., St. Louis, Mo.; Mihran K. Kassabian, M. D., Philadelphia, Pa.; H. C. Bennett, M. D., M. E., Lima, Ohio; S. D. Greenwood, M. D., Neenah, Wis.; J. Mount Bleyer, M. D., New York, N. Y.

Secretary—T. Proctor Hall, Ph. D., M. D., Chicago.

Treasurer—O. W. McMichael, B. A., M. D., Chicago, Ill.

The vice-presidents are, under the constitution, the presidents of various state Electro Medical Societies.

Dr. H. Preston Pratt was re-elected chairman of the Executive Council.

At the session of the Illinois State Medical Society the following officers were elected:

President—T. P. Hall, Ph. D., M. D.

Secretary—Hamilton Forline, M. D.

Treasurer—P. S. Replogle, M. D.

American Roentgen Ray Society.

The fourth annual meeting of the American Roentgen Ray Society was held in the auditorium of the Houston Club, University of Pennsylvania, Philadelphia, December 9 and 10, 1903, under the presidency of Professor Arthur W. Goodspeed. The meeting was a very satisfactory and gratifying one, showing great progress in the field of the x-ray worker. The papers, numbering nineteen, were both interesting and scientific and contained an invaluable fund of information. The attendance was good, beyond expectation, many of the members participating actively in the discussions of the papers. From the point of view of work accomplished this was the most successful meeting of the association, even more so than the Chicago meeting. The reports of the secretary and treasurer were exceedingly gratifying showing the association to be in a very prosperous and flourishing condition. The membership at present is about 400.

The first paper on the program was read by Dr. William S. Newcomet, of Philadelphia, entitled

Pathologic Changes in Tissue Under the Influence of the X-Ray.

The author considered the macroscopic and microscopic findings in tissue that has been subjected to the action of the x-ray, summing up with the statement that the degenerative changes are by no means peculiar to the ray, nor characteristic. Slight burns resemble a sunburn. Severe burns are peculiar and may run through an incubation period of some months. When the ulcerative process does not extend deeper than the superficial structures no scar is formed, but when the ulceration extends into the deeper structures scarring is inevitable. The important early changes seen in the tissues so exposed are, first, fatty degeneration with vascularization of the epithelial pearls; second, leucocytic infiltration of a varying degree, which completes the destruction. Bodies which can not be distinguished from Plimmer's bodies are found in the tissues. In fact, these are changes characteristic of epithelioma, which, as we know, yields to the action of the x-ray. The degenerative process is dependent upon the tissue exposed and the method of application of the x-ray. It appears that the hair follicles are more susceptible to the action of the ray than other tissue, altho the reason for this has not yet been determined. The growth of some tissues is stimulated by the x-ray.

The discussion of this paper was opened by Dr. Gordon G. Burdick, of Chicago, who did not agree with the essayist in his conclusions. He has failed to note that the growth of tissues was stimulated by the ray, altho that result may have been due to the fact that the author uses a very penetrating ray which possesses stimulating qualities. Personally, he prefers a tube with just sufficient penetration to reach the tissue to be affected thereby, because the result is a much more gratifying one and there is less likelihood of burning. He finds that the epithelial tissue suffers at the expense of the connective, but whether the epithelial tissue is choked by the connective tissue, or whether the epithelial tissue is killed and the connective tissue simply takes its place, has not yet been proven.

Dr. Clark, of Olean, N. Y., has found that the longer the history of the case the surer the result, and the more acute the case the surer the irritation; and these latter cases are best submitted to the caustic treatment.

Dr. Weston A. Price, of Cleveland,

Ohio, raised the question whether it is possible that all tubes have in them a great variety of penetration, from high to low; because in low tubes you still have some rays having a high penetration, and in a high tube we have rays of low penetration. Therefore it is impossible to select tubes having rays of only a certain penetration.

Dr. Henry Hulst, of Grand Rapids, Mich., said that a tube having a high resistance is not necessarily a high tube. It is, in his opinion, useless to attempt to measure the penerating power of the x-ray, because the reaction is the same. Regarding the stimulating effect of the x-ray, it is the universal opinion that the first effect of the ray is that of stimulation, and that this is followed by depression, and then dissolution. This action is just as true of the x-ray as it is of certain drugs. The effect of the ray is dependent to a large extent on the quantity absorbed or taken up by the tissues. The rays from a penetrating tube pass thro the body without affecting the tissues very much; therefore the effect is the same as that produced by a small amount of radiance emanating from a soft tube.

Dr. Burdick stated that all his therapeutic tubes were reduced below the line where any ray is given off, and that he could control the degree of penetration of the ray by the speed with which he drives the cathode stream, and this is controlled by the electro-motive force of the apparatus. He described at some length his methods and apparatuses and the differences between fluoroscopic and photographic images caused by static machines and the coil in this connection, which are well known to all radiographers.

Dr. Newcomet, in closing, called attention to the fact that the discussion had drifted away from his paper. What he said was that slow-growing deep or superficial growths always do well under this treatment, but that rapid-growing growths do not, because they soon cause metastases.

Dr. Charles Lester Leonard, of Philadelphia, followed with a paper entitled:

The Results of the Roentgen Method in the Diagnosis of Renal Calculus.

The x-ray affords a more steady differentiation of calculous conditions in the kidney and surrounding organs than any other one method. It is precise, comprehensive and free from danger. It facilitates operation by giving size, number and location of the calculi. It eliminates the possibility of operating on the wrong kidney; reduces operative trauma and shock, and renders exploratory operations unnecessary. A positive diagnosis can be made with an error of less than 3 per cent; but it will not be used universally as a diagnostic agent until its use is demanded by the general practitioner. It is also useful in differentiating between various lesions of the kidney; between ureteral calculus, appendicitis and oophoritis. The negative diagnosis is as absolute as the positive, a calculus being found in only one case out of eighty-nine in which the skiagraph did not show any shadow of stone. If the operator fails to find a stone when it is shown by the skiagraph, the probability is that the former is an error. A more careful search usually will reveal the calculus. The author also exhibited a number of skiagraphs and lantern slides illustrating calculi in the kidney and ureter, and pointed out some of the errors that are made in interpreting the shadows.

Dr. James B. Bullitt, of Louisville, Ky., in opening the discussion, said, that the value of this method is incontrovertible, but that success in its application is dependent upon several factors—experi-

ence, good apparatus, and especially skill in interpreting the plate and in detecting shadows, because some stones are very small, and some possess little density, especially those composed of uric acid. The surgeon in particular appreciates this method of differentiation because it possesses all the advantages claimed for it by Dr. Leonard. He cited a case in point. A diagnosis of renal calculi was made without the use of the x-ray, and because the kidney tissue was destroyed in large part a nephrectomy was done. On opening the kidney two stones were found in the pelvis. For experimental purposes the kidney was rayed, and to the astonishment of the operator another stone was discovered high up in a calyx. Without the x-ray it would have been impossible to find this stone, and if the kidney had been in such condition that its removal would have been unnecessary, the operator would have removed the two stones in the pelvis and the third stone would have remained in situ, thus invalidating the operation and making another operation necessary. Many similar cases have been reported by others, and that is the most conclusive evidence in favor of using the x-ray as a routine method of diagnosing calculous disease of the kidney. The tube should be of such a character that shadows of less density than the stone are demonstrable. When viewing a microscopic slide we find that many objects can be brot into view only by reducing the light considerably, because of their slight density.

Dr. Henry Hulst, of Grand Rapids, Mich., finds that much better work can be done in this particular field by cutting out the secondary rays by means of compression of the body, thus lessening the distance between the anode and the plate. Another method which has been advocated is inflation of the colon with air. It is especially useful in large subjects and it obviates the necessity of having a tube possessing a particular penetration. He exposes for two minutes, using a tube that will penetrate through six openings in the Walter skiameter. For small subjects a penetration through five openings is sufficient.

Dr. Leonard in closing said that his technique was the very simplest. He does not use compression or inflation, nor does he make use of any apparatus except that necessary to make the skiagraph. He places his patient on the back, elevating the head and hips so that the lumbar region will be in close contact with the plate. He uses a tube having a resistance of from one and a half to two inches parallel spark on the apparatus he uses (this factor varying considerably on the individual apparatus), places this at a distance of eighteen inches from the body and makes a very short exposure. If the patient is inclined to be fleshy he increases the vacuum to two and a half inches with a parallel spark gap, and elevates the tube.

Dr. Clarence Edward Skinner, of New Haven, Conn., presented a paper entitled:

Two Cases of Severe X-Ray Necrosis, Presenting Some Unusual Features.

The noticeable features of the first case were: (1) The depth to which to the necrotic process extended. (2) The tanning and excessive proliferation in spots of the epithelium of the new skin that was exposed had been browned directly by the ray, which new epithelium had not been exposed to the ray and was apparently normal in color and structure when it first developed. (3) The cessation of pain as soon as the necrotic tissue had completely separated. (4) The favorable effect of the galvanic current in hastening the healing process after the

necrotic tissue had sloughed off. (5) The appearance of the area of necrosis five months after the last x-ray application in a region which had previously exhibited no evidence that such an injury had been inflicted. (6) The happy effect of the anesthesene and talc mixture in relieving the pain of the last mentioned ulceration.

The noticeable features of the second case were: (1) The sudden appearance of a subcutaneous effusion of blood in areas which subequently became necrotic. (2) The spontaneous development of profuse erythema and structural modification in the newly formed skin exposed by the exfoliation of that which had been browned by the direct agency of the rays. (3) The cessation of the pain as soon as the necrotic tissue had separated completely. (4) The apparent failure of the direct electric current to accelerate the separation of the necrotic tissue, and its gratifying effect upon the reparative process after this tissue had sloughed. (5) The appearance of an area of necrosis six months after the last x-ray application in a region which had previously exhibited no evidence that such injury had been inflicted. (6) The aggravation of the pain produced by the anesthesene and talc mixture. These two cases are a warning against exposing a patient to the x-rays with even a moderate degree of frequency thro long periods of time, no matter how well they seem to bear them at first.

Dr. Skinner also reported a case of cervical adenitis treated successfully with the x-ray, in which there followed a marked growth of hair over those parts of the face and neck that were exposed to the ray. Similar instances were reported by Drs. Newcomet, Pancoast, Allen, Girdwood, Bulhitt and others.

Dr. Henry Hulst, of Grand Rapids, Mich., contributed a paper entitled:

Skiagraphy of the Chest.

This very excellent paper considered the value and technique of skiagraphy of the chest, and was supplemented by skiagrams and lantern slides. The author arrived at the following conclusions: Skiagraphy of the chest is a valuable supplementary method of physical diagnosis, and especially so when it is desired to obtain pathologic detail. The subject must be at rest and the respiration suspended for a second, one second exposure sufficing to give a good skiagram. To skiagraph limited portions of the chest, diaphragms should be used. To secure contrast the plates may be sandwiched between calcium tungstate screens. The induction coil is better than the static machine for this work. The tube must be able to keep its vacuum. The lowest tube that will do the work is the best for this purpose.

Dr. Mihran K. Kassabian, of Philadelphia, followed with a paper entitled:

How to Obtain an Instantaneous Skiagraph of the Thorax.

He said that the coil is the most important part of the x-ray equipment; it will excite a tube more effectively than will the static machine. The best coil should be of twenty inches spark-producing capacity. Of equal importance is the interrupter. In thoracic skiagraphy the electrolytic interrupter is the best. A rapid make and break, from 8,000 to 16,000 vibrations per minute is very satisfactory. The mechanic interrupter is unsuited, because the vibrations are not sufficiently rapid for quick exposure. A tube with a high vacuum and high penetration is highly essential in rapid skiagraphy of moving tissues. The degree of penetrability is best measured with the fluorescent screen. Intensifying screens should be used only when the condition of the patient demands the shortest possible ex-

posure. The plate must be a highly sensitized one.

Dr. Kassabian also exhibited a specially constructed table of his invention for taking skiagrams. It is so arranged that the patient can with comfort and convenience assume any position that may be necessary for taking a good skiagram. An adjustable plate holder and diaphragm forms a part of this apparatus. It simplifies the work very much and makes it much more accurate than when done in the usual way.

The discussion on the papers by Dr. Hulst and Dr. Kassabian was opened by Dr. Gordon G. Burdick, of Chicago, who said that he was of the opinion that better results are obtained from prolonged exposures, fifteen or thirty seconds. Another item is the great loss of tubes in this instantaneous work. Successful instantaneous skiagraphy is largely dependent on a good developer. Amidol, rodinol and metol are the best and preferable to the hydrochinon, which altho the most contrasty developer is also the most contrary and the slowest; it is unsuited for this instantaneous work.

Dr. Preston M. Hickey, of Detroit, Mich., was of the opinion that sufficient attention is not given to a complete interpretation of all the shadows shown in an instantaneous skiagram. The shadows of the bloodvessels and bronchi are very apt to be mistaken for areas of consolidation unless both sides of the chest are compared very carefully.

Dr. William E. Sweet, of Philadelphia, contributed a paper on

Localization of Foreign Bodies by the Roentgen Rays.

The author considered the subject with the view of locating accurately any foreign body. In this connection he exhibited two apparatuses, one for locating foreign bodies in the head, and the other for the whole body, especially the extremities. The principle of his method is to take two skiagrams at such angles that the exact location of the foreign body can be determined by a very simple calculation, yet an accurate one.

Dr. Henry E. Waite, of New York City, followed with a paper on the

Care of the Static Machine.

He said that the arch enemy of the static machine is vapor, which should be kept out of the machine by judicious cleaning, or by building the machine airtight. He fills two or three fruit jars with a mixture of two parts of ice and one part of rock salt; places these jars inside of the apparatus for fifteen minutes, then removes the accumulated water, replaces the jars again for a short time. Calcium chloride is then put into the machine. This must be baked thoroly first, and as soon as it crumbles it should be removed and replaced. The case can also be dried out by placing on the inside a lighted Bunsen burner, the plates revolving slowly all the time; but care must be taken that the burner does not smoke. If the machine refuses to charge it is an indication that there is too much vapor. But after following the procedure above outlined, it will be found that the machine can be made to charge inside of half an hour. Whenever the atmosphere is cold and dry it is advisable to take out both doors of the machine and allow the plates to revolve slowly for half an hour.

The plates should be cleaned with kerosene oil, followed by vaselin. This loosens the dirt and also rubs it off. The brushes should be boiled in caustic potash; then hot water, and dried thoroly. All the buttons and sectors should be cleansed with the kerosene oil. The operator should not neglect to clean the glass legs of the platform. By keeping the machine free from

vapor and dirt good results can be obtained in all kinds of work.

Dr. W. W. Johnson, of Rochester, N. Y., after saying a few words in defense of the Wimshurst and Toepler-Holtz machines, said that he had tried a number of methods for drying out his machines and he finds that the best of them all is the use of calcium chlorid. He bakes the calcium chlorid, stirring it all the time, until he has a mass resembling maple sugar. This mass is very porous and will soak up water faster than any other substance. He keeps some of this mass in the machine all the time, replacing it with a fresh lot whenever it is necessary. The machine is dried out completely in from fifteen to thirty minutes. If the brass plates were lacquered instead of being plated, the machine could be kept clean more easily.

Dr. John C. Pitkin, of Buffalo, combats the vapor in his machine by placing into a chamber that he has built into the machine half a bushel of common quicklime. The lime cannot scatter through the apparatus; in fact, this need never be opened when the lime is put into the chamber. There is sufficient air circulation so that the machine is ready for use in a very few minutes. It is important not to let the lime come in contact with any part of the machine.

Dr. Wetherell, of Philadelphia, determines the amount of moisture in his machine by placing in the apparatus a piece of paper moistened with a solution of chlorid of cobalt.

Dr. Gordon G. Burdick, of Chicago, did not approve of putting a chemical drier inside of the static machine, except calcium chlorid, as used by Dr. Johnson. The best as well as the cheapest hygrometer is a gingerbread cookie placed inside of the machine. If you can bend the cookie without breaking it there is too much moisture in the apparatus. The Wimshurst machines are the least susceptible to moisture short of deluging them with water. He has provided his apparatus with an inlet and an outlet valve, and by means of an electric pump he exhausts the air from the apparatus, passing it thru calcium chlorid, thus making it moisture-free.

Dr. G. P. Girdwood, of Montreal, Canada, has used a Wimshurst machine for two years without having to dry it out. In using chlorid of calcium it is necessary to be sure that you get the right thing. He cited an instance where the druggist sent a man some carbid of calcium instead, and, of course, the machine would not dry out.

Dr. Johnson, of Pittsburg, referred to a similar instance, the carbid exploding and causing considerable damage.

On the evening of the first day, the president, Prof. Arthur W. Goodspeed, delivered his address. He choose for his subject

The Trend of Modern Thought Upon the Subatomic Structure of Matter.

The paper was exceedingly interesting and the author discussed his subject in full from the standpoint of physics. It is impossible to give an abstract of the paper because each part was so closely connected with what followed, and we must refer the reader to the complete article.

The program of the second day was opened by Dr. Preston M. Hickey, of Detroit, Mich. He considered

The Development of the Skeleton, Radiographically Considered.

This excellent paper was very freely illustrated by means of lantern slides and showed that the author had given the subject considerable thot and time. He exhibited radiographs showing the ossification of all the bones in the body; the time

when it begins; time of completion; order of occurrence in the various bones and the time of occurrence. The work is valuable not only from an embryological and anatomic standpoint, but also clinically. He arrived at the following conclusions:

1. The radiograph offers a simple means for studying the formation of the bones of the body.

2. To the anatomist it offers a simple means for studying the formation and conformation of the epiphyses of the bones.

3. The statements in the anatomies concerning bone development should be revised according to the knowledge gained by the radiograph.

4. Reproductions of radiographs of fetuses at different ages should be inserted in our anatomies in order to elucidate a phase of the subject that is at the present time neglected somewhat, nor is it perfectly understood.

5. For diagnostic purposes radiographs of an injured joint should always be compared with the radiograph of the normal uninjured joint. It is the only positive means of making a correct diagnosis.

Dr. G. P. Girdwood, of Montreal, commented on the importance of having these studies made. It gives us correct information as to the time of bone information; the normal appearance of children's bones and joints, and possibly may serve to give us a clue as to the probable age of a child, a very important matter from the medicolegal standpoint. The speaker exhibited several skiagrams of monstrosities, showing the nature of the maldevelopment.

Dr. Charles L. Leonard, of Philadelphia, showed two slides, one of a normal fetus at term, in which he had injected the bloodvessels very carefully; the other a cretin, showing all the malformations of the bony skeleton.

Dr. James B. Bullitt, of Louisville, Ky., said that a complete radiographic history of the growing skeleton was a matter of the greatest importance clinically in the study of fractures of the bones, and every anatomist should make a detailed study of this subject, so that it can be presented in proper form to the medical student.

The next paper was contributed by Dr. Kennon Dunham, of Cincinnati, Ohio, who considered

The Effects of X-Rays on Lower Animal Life.

The author used in his experiments a number of animals, which he subjected to various experiments in order to determine the effect of the x-ray on tissue. He believes that living tissue is stimulated when subjected to properly attenuated projective force. Those who claim that the kathode rays and not the x-rays are essential to the destruction of epithelium are probably wrong. In his experiments he found that the animals used possessed varying resistance to the rays. Some were not affected by it, while others were killed outright. The closer the tube to the object the more destructive the ray. Low tubes excited by small currents are not so destructive as low tubes excited by heavier currents. Very high tubes have very little effect. For the destruction of epithelioma and sarcoma cells a low tube, excited by a heavy current, is the best.

Dr. Wm. H. Dieffenbach, of New York City, called attention to the work done by a German scientist in this connection. Instead of using animals, he experimented on spermatozoa, using the rabbit for that purpose. He found that those rabbits that were exposed to the ray lost all sexual power and that their spermatozoa were dead, a point that should not be lost sight of by the x-ray operator, so as to avoid unnecessary exposure.

Dr. Henry E. Waite, of New York City, criticized the indiscriminate use of the terms high tube, low tube, soft tube and hard tube. The amount of gas in a tube is responsible for these terms, and it amounts to nothing. It is the penetration of the tube that is significant, and it is really the only thing that can be determined.

Technique for Making Good Dental Skiagraphs.

was the title of a paper read by Dr. Weston A. Price, of Cleveland, Ohio. The essentials are a relatively high penetration and a large volume. The former gives the contrast between dense substances, such as tooth substance, bone and root fillings. The large volume is essential for short exposures, which are necessary to secure the best definition. This requires a very powerful generator. He prefers a large coil and Wehnelt interrupter. A tube is required that will make quite transparent and white the bones of the hand. For locating abscesses use a tube of lower penetration than you would use for locating root fillings. The author uses a specially prepared film of very flexible celluloid, which is covered with a waterproof and lightproof container (unvulcanized black dental rubber calendered thin). This film can not be either bent, broken or scratched. The technique followed is given at length, but with the exception of the points mentioned does not differ from that usually pursued.

Dr. L. E. Custer, of Dayton, O., in discussing the paper, took exception to the Wehnelt interrupter being the best to use with the coil. Personally, he favors a porcelain diaphragm, with a hole thru it. It is simple and easily controlled and very efficient. It consists of a porcelain cup, having an inside capacity of two inches by six. Near the bottom is a hole, at an angle of forty-five degrees. The cup is poised in such a manner that it can be tilted to one side or the other. The volume of current is in direct proportion to the size of the opening, and the frequency of interruption is proportionate to the period of time that each bubble of gas is displaced, and the circuit is again established. The thickness of the wall and the depth of the solution also modifies the frequency of interruption. He cautioned against using too high a tube, but advised a tube having a fixed vacuum. The protection of the film as advised by the author is unnecessary. He places two films face to face inside of two separate coverings of black waterproof paper, thus answering every purpose as to precaution, and also giving him two films with every exposure, each of which can be developed in a different manner.

Lantern slides of deformities of the teeth were exhibited by Drs. Cryer, Goodspeed, Pancoast, Leonard, Cook and Kassabian. Dr. Kassabian places the film on the outside and sends the ray into the mouth thru the partly separated teeth. While a longer exposure is required, yet the relation of the other is shown better because it obviates the necessity of using a small film, as is the case in the intraoral method as described by Dr. Price. Dr. Price, in his closing discussion, said, in reply to Dr. Cryer, that in order to locate exactly an impacted tooth he invariably took two pictures at different angles, and that gives not only the location of the tooth, but also the direction of its roots, so that proper extraction can be done.

Dr. Gordon G. Burdick, of Chicago, discussed

Developers.

In his opinion, pyrogallic acid is the best for all purposes, but is not used in large cities, where there is so much or-

ganic matter. It injures the hands very severely, in one instance necessitating amputation of the arm. Eikonogen is very slow, unless used in concentrated solution, and then it reduces the silver not polarized by light, causing confusing shadows. Hydrochinon is most contrasty developer, but it is very slow. It builds up the high lights at the expense of the shadows. It does not fog or veil the plate. The negatives have only two tones: high lights and shadows. It requires three hours to reduce polarized silver. Metol works very rapidly and gives a wealth of detail. Negatives are soft, but finer tones show beautifully by transmitted light. It is the best developer for stereoscopic photography. Amidol is very rapid and is the best developer for instantaneous skiagraphy. The negative is very fine and transparent, so that good positives can not be made without intensifying the negative. Combination developers give better satisfaction, because you can take the good qualities of each developer, submerging the less desirable. He uses a mixture of ortol and metol. It gives the best negatives, but is not suited to instantaneous work. The solutions are as follows:

Sol. A.—Metol.
Ortol, 15 grams each.
Pot. Metabisulf., 8 grams.
Pot. Brom., 1 gram.
Distilled water, 1,000 grams.

Sol. B.—Sod. Sulfite, dry, 40 per cent., and Sod. Carb., dry, 60 per cent., in water, 1,000 grams.

Use thirty cc. of each and dilute with water according to the effect desired. The less water the more contrast, or by diluting the softer the negative. Ortol imparts a brown color, which gives the greatest possible contrast. It will not fog or veil, no matter how long the plate is left in the solution. Metol brings in a wealth of detail and does not fog the plate. Sodium sulfite imparts a black stain to the silver molecule. The metabisulfite of potassium preserves the developer and prevents the action of the oxygen in the air on the solution. The sodium carbonate is a time saver. It is not required usually and is harmful. If used in too great strength there is a loss of the sharpness of the lines. The gelatin becomes soft, changes its position on the plate and relation is lost. Temperature is accountable for most failures to get good results. It should be neither too cold nor too warm.

In discussing this paper, Dr. Mihran K. Kassabian, of Philadelphia, said that the trouble is that operators do not learn how to use a developer. They change too often instead of adhering to one developer and learning its good qualities and its bad qualities and then modifying them to suit the case in hand. The developers are all good if they are used properly, and it is best to select one and then learn how to use it. Good plates are dependent upon the time of exposure, the dilution of the developer, its reaction, the temperature of both the developer and the room, the particular effect desired, and each is correlated to the other. It is best to go slow, beginning with a weak solution, which you can then modify to suit. Of course, much depends upon what you are after, because in the case of calculi you can develop as you please, but where soft details are desired, the development must be carried on very carefully. Metol has one objection; it irritates the skin, and especially the skin of the x-ray worker.

Dr. Wm. H. Dieffenbach, of New York City, called attention to edinol, which he has found very efficient in the development of plates made of fractures, bone tuberculosis and aneurisms.

Professor Goodspeed confessed to using all the developers. After using one he threw it into a slop jar, and finally he

obtained a mixture of a large number of developers. Whenever he desired to get a particularly good plate he used the slop jar mixture, with good result.

Dr. J. P. Hetherington, of Logansport, Ind., said that he had had the same experience.

Dr. Henry K. Pancoast, of Philadelphia, contributed a paper entitled:

The Therapeutic Effect of the X-Rays, as Shown from the Results of Treatment of One Hundred Cases.

The author considered the value of the x-ray as a therapeutic agent and expressed himself as being very much disappointed with it. He has treated a large number of cases both in hospital and private practice, the latter being the more satisfactory. Most of the cases were epitheliomata and sarcomata, and not more than 10 per cent of these were cured. In the cases of skin disease the result was more satisfactory. Of course, it is very difficult to get hospital or outpatients to submit to proper treatment, because they will come when they please and as long as they please. Then, too, the cases referred to the x-ray man at the hospital are those that are considered hopeless by the surgeon, and nothing much is expected to accrue from the use of the x-ray. This may account, he thot, for his results not coming up to his expectations and for the small percentage of cures in the cases of malignant disease. He showed lantern slides of a number of cases of tumor, and especially keloid, in which the treatment with the x-ray was not satisfactory, but largely because of the intractability of the patients, most of whom were colored. He does not consider it safe practice to expose to the x-ray lupus or any other malignant process that involves more than one kind of tissue. The treatment of all the cases was considered in detail and at length, and the reader is referred to the original paper for a complete report.

Dr. Clarence E. Skinner, of New Haven, Conn., agreed with the author in the main. In the case of tumors involving more than one tissue, the procedure of election is primary operation followed by the x-ray. Malignant diseases involving the ear are not favorable cases. He has never seen a case of cancer of the bone cured by the x-ray. Sarcomata do not respond as well as epitheliomata. He cited a case in point.

Dr. Johnson, of Pittsburg, thot that Dr. Pancoast's unsatisfactory results were due largely to the fact that he had too much material at his command and could not therefore study each case by itself as he would his private cases. When we have failures there is always some reason for it. We have not yet learned all about the x-ray, and when we do we will be better pleased with it, because our results will be more gratifying. It is the failures that make the x-ray worker enthusiastic, not his successes.

Dr. Holding, of New York City, said that the conditions that determined the outcome of a case were the same in x-ray work as in general surgery. In the case of a tumor we must consider the size, duration and location of the growth. The smaller the tumor the better the prognosis. Tumors of slow growth offer a better prognosis than the rapidly-growing tumor. Superficial tumors are more amenable to treatment than deeply situated tumors. These three factors must be considered together, because sometimes a large tumor is a slow-growing tumor. Much better results are obtained from the x-ray if the patient is saturated with potassium iodid. Furthermore, all these cases should be divided into three classes, so that we can get more definite data: First, cases that are operable but refuse

operation. Second, those that are inoperable. Third, those that are absolutely hopeless.

Dr. Deforest Willard, of Philadelphia, is in favor of a primary operation, followed by x-ray treatment. The x-ray is very good in selected cases and it should be used in connection with surgical measures whenever possible. Even if the patients can not be cured, we can furnish them with a great deal of relief, giving them comfort and perhaps prolonging life. For that reason if for no other the x-ray is a very valuable therapeutic agent.

Dr. Pfahler, of Philadelphia, agreed with the previous speakers, but emphasized the fact that our successes simply mean that the proper technique has been employed.

Dr. Igelhoff, of Chicago, reported very good results in the treatment of sarcomata and extensive carcinomata.

Dr. H. Russell Boggs, of Pittsburg, reported a case of keloid of the cheek about the size of a dollar that he cured in one year. In regard to cancer of the breast, he has found that those cases that are treated with the x-ray after a primary operation do best from which the axillary glands have not been removed. In his experience sarcomata have been retarded in their growth but not cured.

Dr. Wm. H. Dieffenbach, of New York City, said that his experience tallied with that of Dr. Pancoast. Of a very large number of cases treated at the Flower Hospital only about 10 per cent were cured. Most of the cases that presented themselves for treatment were inoperable. He emphasized the importance of giving constitutional treatment in all these cases. The results will be better. He reported cures in cases of lupus vulgaris, lupus exodens and even lupus erythematosus, a disease that is considered incurable. The diseases most amenable to treatment are epithelioma proper, discoid epithelioma and primary scirrhus carcinoma of the breast. He does not agree in having a primary operation in all cases, because it induces the patient's vitality too much and interferes with the action of the x-ray. The least amenable is sarcoma, a number of cases dying of toxemia.

Dr. C. W. Leonard, of Philadelphia, stated emphatically that he not only believed in the value of the x-ray as a therapeutic agent, but also that he favored primary operation followed by x-ray treatment whenever such a course is possible. The x-ray is also a palliative in inoperable cases.

Dr. C. W. Allen, of New York City, said that he combined everything in the treatment that could be of the least value to the patient and his results have been excellent. Of ninety-five cases of cancer treated with the x-ray he has a percentage of thirty-three or thirty-four cures, including those still under treatment. If absolutely hopeless cases are excluded the percentage of cures runs up over 50 per cent. He prefers the use of the caustic paste to the knife.

Dr. Weston A. Price, of Cleveland, has used the ray with success in the treatment of pyorrhoea alveolaris.

Dr. George J. Hopkins, of Brooklyn, spoke of the value of the Finsen light and light therapy in general. He is using radium in the treatment of many conditions in which the x-ray has hitherto been used exclusively.

Mr. Martin I. Wilbert, of Philadelphia, read a paper on

A Comparative Study of Fractures of the Extremities.

He called attention to the fact that many cases of fractures in or near a joint are overlooked entirely, or they are diagnosed as sprains. The only positive means

of making a correct diagnosis in these cases of injuries about a joint is the x-ray, but he advised that two exposures be made so as to show the joint from two sides; otherwise the fracture might not show. Furthermore, in cases of fracture of an extremity it is advisable to include in the skiagram the nearest joint. Joint skiagrams should always be compared with the normal picture.

Dr. Russell H. Boggs, of Pittsburg, said that fractures should be examined not only for the purpose of making a diagnosis but also to give us the clue as to the proper treatment to be instituted. A fluoroscopic examination is worse than useless because it is unreliable. A skiagraph should always be made.

Dr. James B. Bullitt, of Louisville, dwelt on the importance of deferring a diagnosis of sprain until a skiagram has been made. He complimented the work of Mr. Wilbert very highly.

Dr. Boggs discussed

Accuracy in X-Ray Diagnosis,

considering in his paper all those things that are necessary to the making of a good skiagram. He laid especial stress on the choice of a good developer. He uses the following:

Edinol, 1 dram.
Sod. Sulph., 10 drams.
Sod. Carb., 2 drams.
Water, 10 ounces.

Dr. Pfahler, of Philadelphia, said that he had succeeded in diagnosing a gumma of the brain, two and a half inches in diameter, and also softening of the brain, locating the lesion in each instance accurately.

Dr. Kassabian, of Philadelphia, cautioned that in taking skiagraphs of the skull the head be shaved carefully because the hair may throw a very confusing shadow. He cited a case in point. In skiagraphing the skull care must be taken in the subsequent interpretation of the shadows to allow for the difference in the thickness of the skull, especially in the occipital region.

Collapsing Tubes.

Dr. Henry K. Pancoast, of Philadelphia, related three instances of collapsing tubes. In two of these there was no evident reason for the collapse. In the third it followed a blow. In the first case the tube was a new one that had been used but a few times and it exploded in the hands of the writer. He insisted on the importance of wearing protecting glasses while handling these tubes because serious injury of the eyes might otherwise result.

Several of the members reported similar instances of collapsing tubes and in most of the cases the tubes were of the same make. The belief was expressed that this was due to the fact that these tubes were not annealed before they are put on the market. The same tubes that have been in use for a number of years are giving satisfaction, probably because the repeated heating to which they are subjected has annealed the tube and there is less likelihood of its collapsing.

The last paper on the program was read by Dr. John C. Pitkin, of Buffalo, entitled

Dangers to the X-Ray Operator.

The author considered the dangers to which the x-ray operator is exposed, describing very vividly the x-ray burn and its attendant symptoms. He offered the following conclusions:

Never allow the use of any part of the body for others to look thru. Never change the adjustment of the tube or the position of the patient while the apparatus is in operation. Never to get in front of the fluoroscope as an x-radiometer. Never allow strong destructive rays in the center of the field to join be-

yond the body. Wear silk or rubber gloves or safety x-ray gloves. Wear glasses as a protection for the eyes. Wear an office coat with extra long sleeves that come well over the hands, into which the hands can be withdrawn; the entire garment to be lined with tin foil or lead foil. Remain behind the target of the static machine. If obliged to enter the field remain as far away from the excited tube as possible and work in the outer confines of the field. Screen yourself as much as possible.

Dr. Weston A. Price, of Cleveland, exhibited a flexible rubber cloth prepared according to his instructions, that possesses all the qualities that render it useful as a foil against the x-ray. It is opaque to the rays; flexible, firm, easily cleaned and handled and will not break. He suggested that the increasing tendency to burn on the part of the operator might at some future time lead to very disastrous consequences. It is also possible that the x-ray has a cumulative action which later in life may culminate. The possibilities of the future for the x-ray worker are not very bright. He also devised a tube holder made of hard vulcanized rubber containing an opaque material. It is very light and efficient. He uses it especially for treatment work. It is an absolute nonconductor.

Dr. James A. Marsh, of Troy, N. Y., called attention to the fact that from having his feet under the table within the x-ray field he was suffering very severely with sore feet.

Dr. W. W. Johnson mentioned a case of burn of the knee on the side opposite to the one treated.

Professor Goodspeed gave it as his opinion that these effects were secondary. That the whole room and its contents are rendered negatively active during the action of the tube.

Dr. C. L. Leonard, of Philadelphia, has suffered severely from burns of the hands and also feet. He now protects his tube in such a way that the rays are not carried out into the room. This eliminates the danger from the direct radiance of the tube and also the danger from the secondary action mentioned by Goodspeed. He places his tube in a paper box partly surrounded by tin foil so arranged as to give the necessary protection and yet not interfere with the efficiency of the ray. Of the remedial agents he has found resorcin soap and lanolin inunctions of value. Under that treatment the ulcers have healed. Boric acid solution is also useful.

Dr. Kassabian keeps his coil near the ceiling and the tube in his apparatus described earlier in the session, this saving himself and his patient from burns. The important feature in this connection is not how to prevent the burn, but how to cure it.

Dr. Louis A. Duhring, of Philadelphia, said that the x-ray burn was peculiar to itself and so far as he knew there is no one remedy that will cure. Different operators have been cured by different remedies and there is no way in which to account for the action of a drug in any one case. He considered the differential diagnosis of various skin lesions that simulate, in a way, the x-ray dermatitis.

Dr. Fairfax Irwin, of the U. S. P. H. & M. H. S., was able to heal two very severe and intractable x-ray burns by excluding both air and light, especially the latter, from the ulcers. No other form of treatment had availed in these cases. He placed the affected part in a box.

The following officers were elected for the ensuing year:

President—Dr. James B. Bullitt, Louisville, Ky.

Secretary—Dr. Russell H. Boggs, Pittsburg, Pa.

Treasurer—Dr. Weston A. Price, Cleveland, Ohio.

Vice-Presidents—Dr. J. B. Murphy, Chicago, Ill.; Dr. Barnes, Buffalo, N. Y.; Dr. E. A. King, Toronto, Can.

Executive Committee—Dr. W. W. Johnson, Pittsburg, Pa.; Dr. Preston M. Hickey, Detroit, Mich.; Dr. Kennon Dunham, Cincinnati, Ohio.

The place of meeting of the next annual session was not decided upon. St. Louis and Cincinnati were two cities in the list of those considered, with the latter in favor.

Electro-Physics.

Light Telegraphy.

The system of transmitting telephone messages by means of the rays of an arc lamp, which was developed by Herr Ernst Ruhmer, has been extended to the transmission of telegraph messages, in which work it is thought that it will compete with the heliograph. In the telephone system devised by Ruhmer, the sound waves of the voice are changed into electrical waves by means of the microphone, and these waves are used to vary the intensity of the current passing through an electric arc. Variation of the current caused a corresponding variation in the intensity in a ray of light which was projected to the receiving station, where it was received upon a suitable reflector, and thrown upon a selenium cell. The variations in the light received changed the resistance of the selenium cell correspondingly, and thus were made to reproduce the original sounds in a telephone receiver. In the present system the action is practically the same, except that the variations in current are caused by means of a telegraph key, instead of a telephone transmitter. In this way the Morse signals are sent out, and are received in practically the same way as in the telephone systems. It is thought that this system will be particularly useful for military purposes, where secrecy is desired, as the variations in light can not be followed by the eye or with a telescope, but can only be detected with a proper telephone receiver.—*Electrical Review.*

Effect of Electricity on Plant Growth.

One of the methods of testing the effect of electricity on the growth of plants, and which seems to be most readily accomplished, consists in burying plates of zinc and copper on either side of the plant to be experimented upon, and connecting these plates by means of wires placed above ground. The current generated passes through the earth and roots and thus, it is alleged, promotes a more healthy growth.

Static electricity has been utilized for the same results. Professor Lemström, a Russian, has carefully experimented for the purpose of finding the exact nature of the action of electricity in producing these results, and assumes that electricity "produces an augmentation of the energy to which is due the circulation of the sap," and that the "more fertile the soil and the more vigorous the growth, the more satisfactory are the results obtained from electrical treatment."

For example, he cites results obtained by the treatment of beets and potatoes, which showed an increase in harvest of 107.2 per cent in the former and 76.2 per cent in the latter case.—*El. Rev.*

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